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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/887,697	11/01/2001	Shih-Fu Lee	8033025/JAS	3474

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EXAMINER

PROCTOR, JASON SCOTT

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/887,697	LEE ET AL.	
	Examiner	Art Unit	
	Jason Proctor	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Claims 1-20 have been presented for examination.

Claims 1-20 have been rejected.

Request for Status

The Examiner acknowledges Applicant's request for the status of the instant application dated January 7, 2005. In light of this Office Action, no further response is deemed necessary.

Priority

The Examiner acknowledges Applicant's request for priority under 35 U.S.C. § 119(e) to provisional application 60/276,764 filed on March 16, 2001.

Drawings

1. It has come to the Examiner's attention that the papers for the instant application have been filed on three separate occasions dated November 1, 2001; August 1, 2002; and August 2, 2002. The drawings supplied with the 2001 filing appear to be complete, however figures 2, 5, and 6 are missing from the August 1, 2002 and August 2, 2002

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filings. The Examiner presumes that Applicant intends for the drawings submitted on November 1, 2001 to be examined. Clarification is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1- are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. In general, the claims recite several steps of mathematical operations that appear to be defined in nonstandard language, leading to a significant number of rejections under 35 U.S.C. § 112, second paragraph. The Examiner provides the following rejections as exemplary of the state of the claims and respectfully requests that Applicant carefully review the claim language beyond the rejections listed below for compliance with 35 U.S.C. § 112, second paragraph.

5. Several claims recite limitations that are unclear due to nonstandard language. For example, claim 1 recites steps such as “discrete Fourier transforming” and “root-mean-squaring” which are interpreted as “performing a discrete Fourier transform” and “calculating the root mean square”, respectively. Applicant is respectfully requested to amend these claims to clarify the language.

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6. Claim 1 recites a step of "providing air bearing code for the head selected" which has several reasonable interpretations to a person of ordinary skill in the art. For example, the term "code" could refer to computer program instructions that correspond to and model the air bearing or it could refer to a particular data parameter that defines how to model the air bearing. It is therefore impossible to properly determine the metes and bounds of this claim.

7. Claim 1 recites the step of "providing a simulated disc topography having a wavelength" but later recites a step of "determining simulated head-media spacing modulation for each of a plurality of disc wavelengths". It is unclear if the second recitation of "wavelengths" refers to the first recitation of "wavelength", if the intervening steps are repeated with different values for the first recitation of "wavelength", or some other interpretation.

8. Claim 5 recites the step of "simulating a head passing in near proximity to a simulated disc media surface to generate an air bearing transfer function for a spectral density" but does not recite the relationship between such a simulation and the generation of an air bearing transfer function. There are countless methods of simulating a head passing in near proximity to a simulated disc media surface but it is entirely unclear how an air bearing transfer function is the outcome of such a simulation.

9. Claim 5 recites a step of "multiplying the topography function and the air bearing transfer function to provide the head-media spacing modulation spectrum." Multiplying a function by a function results in a function, not a spectrum. It is unknown how the recited step produces a spectrum.

10. Claim 6 recites a step of “summing the head-media spacing modulation spectrum to provide a head-media spacing waviness value for the disc media surface.” It is unknown what is meant by “summing a spectrum”. One interpretation would be calculating an integral or the area under the curve of the distribution represented by the spectrum, however this would likely lead to an inoperable device. It is unknown what is meant by this step.

11. Claim 11 recites an equation containing the term “ $d\lambda$ ”. The symbol variable “d” is not defined by the claim and it is unclear whether “ $d\lambda$ ” is a differential of some function of λ , and if so, to what the differential is in respect as well as whether it is the differential of $\Lambda(\lambda)$ or $Y(\lambda)$.

12. It is further unclear what is meant by the notation “ $\Lambda^2(\lambda)$ ”. Generally accepted notation for squaring a function $\Lambda(\lambda)$ would be $[\Lambda(\lambda)]^2$, indicating that the function is to be evaluated, then squared.

13. Claim 13 suffers deficiencies similar to those of claim 11.

14. Claim 14 recites “the model comprises a constant c for breaking the equation into two integrals”. It is unknown what the function of this step is, what the embodiment of the resulting model is, or what integral is being referred to. Neither claims 5 nor 13, from which claim 14 depends, recite any sort of integral.

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15. Claim 17 recites a step of interpolating "to provide the air bearing transfer function with enhanced spectral lines". It is unclear whether the result of this step is "an air bearing transfer function with enhanced spectral lines" or whether an air bearing transfer function is being provided with input that comprises enhanced spectral lines. It is further unknown what is meant by "enhanced spectral lines".

Claim Interpretation

In the interest of compact prosecution, the Examiner makes the following claim interpretations in order to apply prior art to the claims. See *Ex parte Ionescu*, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984).

16. Claims 1-20 are interpreted as methods and systems for determining an acceptable head media spacing due to waviness of a disc media surface, the methods and systems generally defined by a model recited by claim 5.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Magnetic Recording", C. Denis Mee and Eric D. Daniel, eds. (Mee).

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18. Regarding claims 1-20, Mee teaches the importance of modeling the head-medium interface (entirety of chapter 7). Mee provides motivation for accurately modeling the head-medium interface at pages 427-428:

In all magnetic recording configurations, one of the more important parameters is the spacing between the recording element and the magnetic medium. The importance of this parameter can be seen from Fig. 7.1, where the output signal of a typical read-write element is plotted as a function of the head-to-medium separation (Talke and Tseng, 1973).

Mee also teaches that the science of modeling the head-media interface involves several sciences:

Thus, the design of the head-disk interface is an optimization problem, which requires the understanding of not only air-bearing theory but also tribology, materials, magnetics, and mechanics.

Mee devotes an entire section (Sections 7.2 through 7.2.4.2) to the dynamics of rotating disks, including bending and membrane effects.

Mee also teaches the dynamics of the head-disk interface (Section 7.3 through 7.3.2). In this section, Mee teaches that:

The need to maintain a steady spacing between the read-write element and the recording surface is the most important design criterion for a head-disk interface. A magnetic disk is not perfectly flat, and its motion deviates from true in-plane motion due to spindle runout, clamping distortions, and disk vibrations. The slider must follow the disk over these out-of-plane motions. Such amplitude variations in a typical disk file exceed the air-bearing spacing by several orders of magnitude, and are typically in the range of 10 to 30 μm , compared with a head-disk spacing of about 0.3 μm . In order to accommodate this runout with a minimum of spacing modulation, it is necessary to design the head suspension mechanism and the head-disk interface with a high degree of compliance.

These sections also teach models for response to impulse (Section 7.3.1.3) and response to arbitrary nonperiodic force (Section 7.3.1.4), which would be suitable for modeling a variety of forces encountered by the head.

Mee also teaches modeling several different types of heads (Sections 7.5 through 7.5.3) such as a two-rail head or a three-rail head.

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Mee teaches systems (Figures 7.28 and 7.35) and methods (Section 7.8) calculating motion in a head at a range of frequencies.

Mee teaches measurement of hard-disk contacts (Section 7.9).

The entirety of chapter 7 teaches many additional aspects of modeling the head-media interface.

It would have been obvious to a person of ordinary skill in the art at the time of Applicant's invention to combine the teachings of a textbook, such as Mee, with his own knowledge of the particular art to arrive at a computer system that implements the modeling and simulation principles taught by Mee. Motivation is found throughout the Mee reference, as well as in the nature of the problem to be solved and the knowledge of a person of ordinary skill in the art, in order to produce a system that calculate the proper spacing of the head-media interface.

Any claim limitations not specifically mentioned would have been obvious to a person of ordinary skill in the art at the time of Applicant's invention in combination with his own knowledge of the particular art as details of proper implementation of the teachings of Mee.

Conclusion

Art considered pertinent by the examiner but not applied has been cited on form PTO-892. In particular, US Patent No. 4,396,965 (1983) teaches that it is well known in the art to model the head media spacing of a disc drive (column 1, line 50 – column 2,

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line 25). US Patent No. 6,529,342 teaches controlling the fly height of a magnetic head by applying voltage to the head.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

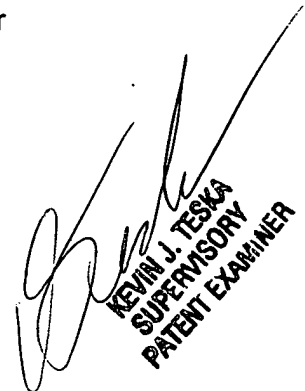
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin J Teska can be reached on (571) 272-3716. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-3713.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Jason Proctor
Examiner
Art Unit 2123



KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER

Requirement for Information – 37 CFR 1.105

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the Examiner has determined is reasonably necessary to the examination of this application:

“Effects of Disc-Microwaviness in an Ultra-High Density Magnetic Recording System” presented by Wei Yao, David Kuo, and Jing Gui at ASME Tribology Conference 1999 in Orlando, Florida

This publication or transcript is relevant to the examination of the instant invention and claims as established by the specification (paragraph 0007), and therefore the Application should provide the office with copies of these publications so that they may be further evaluated for relevance.

The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this requirement and any information disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97.

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The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin J Teska can be reached on (571) 272-3716. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

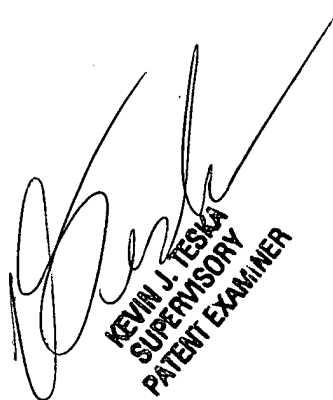
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public

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Jason Proctor
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